

CHAPTER 5

CUMULATIVE IMPACTS

This chapter examines the cumulative impacts of the proposed improvements at Kodiak Airport when combined with other past, present, and reasonably foreseeable future airport actions and regional projects. This chapter builds upon the detailed descriptions of the existing condition of each resource included within **Chapter 4, *Environmental Consequences*** and describes any additional impact that would result from additional projects in a cumulative context.

5.1

Introduction

The purpose of this section is to document the consideration of cumulative impacts of the proposed improvements at Kodiak Airport with other airport and regional projects. The basis for this analysis is the recognition that while the impacts of many actions may be individually small, the cumulative effects of past, present, and reasonably foreseeable actions on populations or resources can be significant. The Council on Environmental Quality's (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) define cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR §1508.7). NEPA requires that cumulative effects be evaluated along with the direct and indirect effects of the actions. As with direct and indirect effects, the no action alternative serves as the baseline against which to evaluate cumulative effects. Cumulative effects analysis necessarily involves assumptions and uncertainties, and data sets that may be incomplete.

When considering the significance of the cumulative effects, the same thresholds of significance used in identifying significant project-related effects are used, and such thresholds of significance are defined in FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*. Where FAA Order 1050.1E has not established significance thresholds, it can be difficult to determine levels beyond which cumulative effects significantly degrade a resource. Local, state, and federal standards for some resources would still apply, and other goals or objectives from land use management plans and other guiding programs may also be helpful. The analyses contained in this document identify any defined thresholds. Where numerical thresholds are not available or cannot be determined, impacts are typically described in relative terms of magnitude.

5.2

Projects Considered in the Cumulative Effects

As defined by CEQ guidance, the consideration of cumulative effects must consider the past, present, and reasonably foreseeable projects. Such projects include actions undertaken at the Airport, as well as notable development undertaken in the airport environs. This section identifies those past, present, and reasonably foreseeable future projects.

PAST PROJECTS: CEQ guidance states, “The availability of data often determines how far back past effects are examined. Although certain types of data ... may be available for extensive periods in the past ..., other data ... may be available only for much shorter periods. Because the data describing past conditions are usually scarce, the analysis of past effects is often qualitative.”¹

The study area is characterized by developed lands. The natural environment has been extensively altered by these past construction activities, including the construction of the Airport and USCG Base. Natural soils are not present, natural vegetation is limited in the area immediately surrounding the Airport and the natural intertidal and marine environment has been altered by the construction of the military and aviation facilities. Detailed data to fully characterize the environmental effects occurring since construction of the airport in the 1940s is generally not available because records were not created and studies were not prepared documenting the environmental effects the multiple natural and human changes made to the landscape. Since construction of the airport, which includes the re-channelization of the Buskin River, there have been multiple earthquakes, storms, and construction projects that have resulted in substantial physical changes to the airport and its surrounding environment. For the purpose of this environmental review, more detailed consideration of past effects is based on changes in condition in the last decade, for which more specific information of past projects is available. Projects completed in the last decade are described in **Table 5-1**.

¹ Council on Environmental Quality (U.S.). *Considering Cumulative Effects Under the National Environmental Policy Act*. Washington D.C. January, 1997.

**TABLE 5-1
MAJOR PROJECTS COMPLETED IN THE LAST DECADE**

Project	Description	Sponsor	Schedule
<i>Infrastructure Projects</i>			
Kodiak Airport	Removal of Obstructions: Removal of brush covered ridge and trees adjacent to the Runway 10 threshold.	ADOT&PF	2002
Kodiak Airport	Rehabilitate Runway, Apron and Taxiway; Reconstruction of the Terminal Apron.	ADOT&PF	2004
Kodiak Airport	Phase 1 Improvement Projects: Construction of Runway 7 Elephant Ear; Navigational Aid and Lighting Maintenance; Obstruction lighting on radio towers; Repaving of existing parking areas.	ADOT&PF	2004
Kodiak Airport	Obstruction Removal – tree removal upstream of Bridge #2 and other obstruction removal.	ADOT&PF	2007/2008
USCG	USCG Fuel Pier Rehabilitation Project	USCG	2008
Buskin River Recreation Site	Rehabilitate the lower parking lot – including a few barrier rocks placed on the shoreline. Addition of an outhouse.	State Parks	2004
Trident Seaplane Base	Removal of rocks in the aircraft operating areas; construction of a ramp to pull seaplanes out of the water and road access to the ramp; construction of an aircraft parking area and lease lots on land; replacing two floats and repairing the third float; fencing, paving and lighting improvements for the floats and adjacent lease areas/road.	City of Kodiak; FAA	2009
Kodiak Airport	Chemical Storage Building Construction	ADOT&PF	2010
St. Paul Harbor Rehabilitation	St. Paul Harbor rebuilt as a small boat harbor with approximately 250 slips including service docks and a major vessel grid, accommodating vessels up to 60 feet in length.	Kodiak Borough	2000
Wind Turbines	Develop a wind turbine system (3 turbines) on Pillar Mountain. May build 3 more in the future	Kodiak Electric Assn	2009-2012

TABLE 5-1, CONTINUED
MAJOR PROJECTS COMPLETED IN THE LAST DECADE

Kodiak Airport	Asphalt Pavement Mill, Crack Seal, and Seal Coat – repair of runways and taxiways	ADOT&PF	2009
Kodiak Airport	Pavement Marking	ADOT&PF	2009
Kodiak Airport	Runway Resurfacing Project	ADOT&PF	2010-2012
Water Treatment Facility	Build new water treatment facility with UV treatment	City of Kodiak	2009-2010
St. Herman Harbor Loading Facility	Installing Dry-dock and boat lifts at St. Herman's Harbor	Kodiak/ DCCED	2010-2011
Mission Road Upgrade	Upgrade and Repair of Mission Road	ADOT&PF	2009-2010
Mayflower Switchbacks Rehabilitation	Rehabilitate Mile 23 to 25 of Rezanof Drive	ADOT&PF	2011

Source: Barnard Dunkelberg & Company

CURRENT AND REASONABLY FORESEEABLE PROJECTS: A number of current and potential future projects are expected during the reasonably foreseeable future for Kodiak Airport and in the surrounding airport environs. As noted in **Section 4.0, Introduction**, this EIS analyzes environmental impacts through 2025; a specific project is considered to be reasonably foreseeable if it is likely to be completed and would occur within that time frame.² Actions that are included in an adopted planning document, have received necessary approvals, or have had funding committed toward their implementation are considered reasonably foreseeable. Similarly, a project is considered reasonably foreseeable if the proponent has committed to completing the proposed action.³

Chapter 2 notes that the approved Kodiak Airport Master Plan has identified a number of improvements that are not ripe for consideration in this EIS, and are independent of the proposed actions. Such reasonably foreseeable projects at Kodiak Airport are included in **Table 5-2**. Also included in this table are potential existing and future projects within the greater Kodiak area.

TABLE 5-2
CURRENT AND REASONABLY FORESEEABLE PROJECTS

Project	Description	Sponsor	Schedule
Infrastructure Projects			
AMHS Dock/ Shoreside Improvements	Rehabilitation of current Pier 1 docking facility	ADOT&PF	2014
Misc. Water/ Sewer Projects	Various ongoing water and sewer upgrades and extensions	City of Kodiak	2009-2019
Rezanof Drive Rehabilitation	Rehab Rezanof Drive from USCG Base to town.	ADOT&PF	2010
Rezanof Drive Rehabilitation II	Rehab Rezanof Drive from town to Mill Bay Road.	ADOT&PF	2013

² FAA Order 5050.4B, paragraph 9.q.

³ Id.

TABLE 5-2, CONTINUED
CURRENT AND REASONABLY FORESEEABLE PROJECTS

Project	Description	Sponsor	Schedule
Chiniak Road Paving	Pave 13 miles of Chiniak Road	ADOT&PF	2011
Chiniak Highway Mp 23.7 Improvements	Realign 0.76 miles of highway; add drainage, paving and striping	ADOT&PF	2013-2014
Anton Larsen Bay Road Extension	Rehabilitate and Extend the Anton Larson Bay Road	ADOT&PF	2018
Kodiak Airport Apron Areas	Construct Apron at Kodiak Airport	FAA	2015
Kodiak Airport Taxiway	Construct "Taxiway F" from the aircraft apron to Runway end 07 at Kodiak Airport	FAA	2015
USCG	Coast Guard Fuel Pier Repair/Replacement Project	USCG	2014
USCG	Renovate Hangar 2	USCG	2014
USCG	Renovate Enlisted Dining Facility	USCG	2016
USCG	Homeporting of new Offshore Patrol Cutters	USCG	2020
Trident Basin Improvements	Additional uplands work at Trident Basin seaplane base.	City of Kodiak	2014
Northland Inc. Cargo Facility	Construct a 3.5 acre facility, including 3.1 acres of fill into marine waters of Womens Bay for a cargo loading and off-loading facility.	Northland, Inc.	2015-2016

Source: Kodiak Airport Master Plan,

5.3

Cumulative Effects Analysis

The scope of projects for cumulative effects consideration can vary by resource, just as the geographic study areas for the different resources may vary. In general, those projects on or within the immediate area of the Airport property are included because they are within the potential impact zone of the proposed Runway Safety Area (RSA) improvements. Additional coverage outside of the immediate impact zone is dependent on the resource being considered, and is influenced by such factors as land use, any unique characteristics of the resource, importance of the resource in a local and regional setting, and the distance the impact within that resource can travel.

COASTAL RESOURCES AND NAVIGATION. Because no impacts to shipping lanes are anticipated, there would be no cumulative impacts to shipping lane and boat traffic resulting from the proposed project.

Minor, localized changes to sediment transport and current patterns may occur under all Build Alternatives. However, none of past, present, and reasonably foreseeable projects are anticipated to affect sediment transport or current patterns in the Project Area that could add cumulatively to the changes from the Build Alternatives. At the time of this analysis, no other marine work is currently scheduled for construction in 2015, other than the Pier 1 docking facility and the Northland Cargo Facility. The reconstruction of Pier 1 would be a docking facility near downtown Kodiak where the Alaska Marine Highway ferry M/V Tustemena currently docks. The Request for Proposals to design and construct the project is anticipated to be advertised in March 2013. Depending on the award date, it is possible the rehabilitation project could take place during the 2015 construction season. However, Pier 1 is located approximately 3.7 miles northeast of Runway end 18 and as such, no cumulative impact related to turbidity and sedimentation is anticipated. The Northland Cargo Facility is the closest project also involving water work, and might have a slight cumulative impact related to turbidity and sedimentation. However, Best Management Practices and timing windows should minimize the potential cumulative impacts.

Long-term effects of the build alternatives in the coastal area result primarily from changes in the salt water/freshwater mixing zones near the proposed structures. As a result, projects which would place structures in water and have the capacity to change the mixing zones of the salt and fresh water were also considered for this analysis. Most projects involving in-water structures are not close to the airport and are not anticipated to change currents in the area. As a result, no significant cumulative impacts to sediment transport or current patterns are anticipated.

Cumulative impacts associated with individual coastal resources not mentioned here, such as water quality and subsistence, are discussed in the sections that follow.

WATER QUALITY AND RESOURCES. All of the proposed RSA Build Alternatives would involve earthmoving activities that could contribute sediments and turbidity to the receiving waters where soils are disturbed during construction. As discussed in **Section 4.2.7, Construction Impacts**, these contributions to water quality would not be significant because in order to ensure compliance, ADOT&PF would be responsible for providing proper erosion control and stormwater management to meet the terms of the APDES permits that regulate the quality of these discharges. Therefore, the proposed alternatives would not contribute to any significant water quality impacts that could be associated with other past, present, or future development projects in the vicinity of the Airport.

In addition to the proposed RSA Build Alternatives, other reasonably foreseeable development in the airport vicinity would create additional impervious surfaces that could affect water quality. These projects have either been considered in separate environmental documentation in recent years, or would be assessed in the future by other parties. Because the immediate airport vicinity is under the oversight of various federal agencies, these developments would be subject to environmental review by these agencies and their permitting.

The potential impacts to water quality from the other past, present, or reasonably foreseeable future projects may be direct and indirect. Construction activities may have short-term direct affects to water quality which include:

- Clearing of vegetation
- Re-grading the existing ground surface
- Milling and repaving of asphalt
- Installing new drainage infrastructure
- Construction of additional buildings

These activities generally change the rate of infiltration, and increase the quantity of stormwater runoff in the basin. Development of impervious areas would create additional stormwater runoff, so mitigation measures for stormwater runoff control would be provided through implementation of appropriate BMPs. Like this project, other future development would be required to meet water quality permit requirements and conduct the necessary required studies; therefore, no significant cumulative impacts would be expected.

Activities and events that could occur with the creation of new impervious areas and additional chemical storage associated with other past, present, or future projects at the Airport include accidental spills, and the need for additional sanding and deicing operations. These activities and events have the potential to affect surface water quality. In order to maintain compliance with state and federal water quality permits, appropriate operations and maintenance BMPs are in place and would be required. These requirements dictate that contaminant concentrations in stormwater are not to exceed state and federal water quality standards.

None of the items in the list of past, present, and reasonably foreseeable actions would significantly affect water quality because the increase in runoff would be small, and the permitting conditions and BMPs would ensure the contaminant concentrations would not exceed state and federal water quality standards. Some of the projects identified as reasonably foreseeable would add additional impervious surface (e.g., construction of the Airport apron, construction of Taxiway "F"); however, these projects would also be subject to existing and future water quality protection measures outlined in the APDES permit for the Airport. The construction and operation of ADOT&PF's chemical storage building on the Airport in 2010 was covered, and continues to be covered, under the APDES permit for the Airport; therefore, appropriate BMPs were used to avoid water quality impacts during construction, and BMPs for operations and maintenance of the building are in use currently. Likewise, all other identified actions would be subject to existing and future water quality protection measures, such as the ADOT&PF and USCG APDES permits. For these reasons, no significant cumulative impact to water quality is anticipated in combination with any of the proposed Alternatives and past, present or reasonably foreseeable projects.

Short-term impacts to marine waters are anticipated during the construction time period (with completion by 2015). At the time of this analysis, no other known marine work in the Project Area or nearby is currently scheduled for construction in 2015, with the exception of the Northland Cargo Facility. The Northland Cargo Facility is the closest project also involving water work, and might have a slight cumulative impact related to turbidity and sedimentation. However, Best Management Practices and timing windows should minimize the potential cumulative impacts.

Long-term effects of the action alternatives (2025) are limited to changes in the saltwater/freshwater mixing zones near the proposed structures. As a result, projects which would place structures in water and have the capacity to change the mixing zones of the saltwater and freshwater were also considered for this analysis and determined to not have a significant effect on sedimentation. All other identified projects involving in-water work are not close to the Airport and are not anticipated to change currents in the area.

WETLANDS AND OTHER WATERS OF THE U.S. The actions associated with past, present, and future projects that could contribute to cumulative effects on wetlands and other waters of the U.S. are:

- The removal of vegetation from wetland and riparian areas,
- The removal or regrading of land surface in wetland and riparian areas, and
- The culverting of Airport area streams.

None of the items in the list of past, present, and reasonably foreseeable actions would result in significant cumulative effects on wetlands and other waters of the U.S. for the reasons described below. Past vegetation removal projects may have had short-term indirect effects on water quality in St. Paul Harbor and the Buskin River. The past culverting of Devils Creek would have had a direct impact on a water of the U.S., but would not directly affect wetlands or waters of the U.S. that are affected by the proposed alternatives. Impacts to Devils Creek would have an indirect long term effect on water quality and the speed that water flows from Devils Creek in to the Buskin River. This might have a minor indirect affect on functions provided by Wetland A. All the identified actions would be subject to Section 404 permit approval by ACOE. For these reasons, no significant cumulative impact to water quality is anticipated in concert with any of the proposed alternatives.

FLOODPLAINS. Actions associated with past, present, and future projects that could impact the Buskin River floodplain are:

- Creation of new impervious surfaces,
- Vegetation removal and land leveling,
- Changes to stormwater drainage systems; and,
- Piping of existing streams.

No known past, present, or reasonably foreseeable projects would have direct impacts to the Buskin River floodplain. The project to pipe Devils Creek would have a direct impact on the Devils Creek floodplain, but would not directly affect the Buskin River. However, it would cause an indirect impact to the Buskin River. Piping Devils Creek would result in reduced travel times for runoff (runoff would reach the Buskin River more quickly than it does currently), which could result in an increase in peak flows and flashier discharges on the Buskin River. However, these changes, combined with the encroachment into the Buskin River floodplain from Runway 18/36 Alternatives (with the exception of Alternative 7), would not be anticipated to result in significant cumulative impacts to the floodplain because they would not result in: (1) a considerable probability of loss of human life; (2) likely future damage associated with the encroachment that could be substantial in cost or extent; or (3) a notable adverse impact on the floodplain's natural and beneficial floodplain values.

None of the items in the list of past, present, and reasonably foreseeable actions would have a potentially significant cumulative impact on the Buskin River floodplain when considered with the proposed project. Several of the present and reasonably foreseeable projects would add additional impervious surface (e.g., larger apron, taxiway), but a relatively small area when compared with the size of the watershed. For these reasons, no significant cumulative impact to floodplains is anticipated in concert with any of the proposed alternatives.

FISH AND INVERTEBRATES. The proposed RSA improvement project would take place in the context of other human changes to the Project Area and Landscape Area. While the proposed project would have little direct effect to species in the area of the airport, the loss and alteration of habitats that are unique to the airport environment and used by various species would result in an indirect effect, including potential localized adverse population impacts to salmonids. This assessment includes the review of other past, present, and reasonably foreseeable fish and invertebrate habitat impacts to assist in the determination of potential impacts to those species.

Initial construction of the airport and military facilities in the 1940s and additional projects since then required extensive alterations to the natural environment, including riverine and nearshore habitats. Filling and grading was required in the lower Buskin River valley from the south side of the Buskin River to Upper Government Hill and out to the shoreline of St. Paul Harbor in Chiniak Bay. Devils Creek was also modified; the creek's flow was redirected through culverts. Intertidal and subtidal habitats along the shoreline adjacent to the runway ends were altered by steeply grading and armoring those areas with rock. An old boat harbor is located on the shoreline between Runway ends 29 and 36; the harbor entrance is protected with jetties on both sides.

On a landscape scale, the cumulative impacts of projects in Chiniak Bay have resulted in an altered shoreline ecosystem. Along the approximately 15-mile-long stretch of shoreline from the City of Kodiak to Womens Bay, approximately 48% of the shoreline is comprised of armor rock (Shorezone 2012). In the Project Area (from Runway End 18 to Runway End 36), 27% of the existing shoreline contains rock armor fill (Shorezone 2012). Past construction projects may have changed sediment transport patterns, the extent of freshwater influence, scour (the way that sediment is removed), and fish assemblages residing in the Project Area.

Past alterations had various effects on marine and freshwater habitats and resources, including:

- Direct loss of intertidal and subtidal marine habitat, eliminating portions of the water column for residence by floral and faunal species
- Direct loss of intertidal and subtidal soft-bottom habitats in the footprint of built structures, and creation of rocky intertidal and subtidal habitat from the structures themselves (e.g., runway fill and armor rock from existing runway ends)
- Direct loss of marine life (e.g., aquatic vegetation and sessile invertebrate species)
- Direct loss and/or alteration of freshwater and estuarine habitat
- Modification of shoreline slope due to increased grade of armor rock embankments, resulting in loss of low-gradient intertidal habitat
- Degraded connectivity of riparian and supratidal areas to subtidal habitats (resulting in decreased inputs of nutrients and invertebrates into marine waters, as well as decreased nutrient processing)
- Increased stormwater runoff due to decreased permeable surfaces and increased impermeable surfaces
- Decreased water quality due to stormwater runoff

These changes have altered and shaped the existing marine and freshwater environment surrounding the Airport and are reflected in the descriptions provided in **Section 4.5.4**. Several of the project Build Alternatives examined in this EIS would produce similar impacts on aquatic habitats and resources; the degree of impact would be dependent upon the size and location of RSA construction (see **Section 4.5, Fish and Invertebrates**). The greatest habitat impacts would result from the greatest amount of fill toward the Buskin River freshwater plume, an important habitat area for many species, including juvenile salmonids and their prey. Because all alternatives (except Runway 18/36 Alternative 7) would result in fill near the Buskin River freshwater plume, these alternatives would significantly add to the already altered nature of the Project Area resulting from past projects.

Other marine projects have been identified (**Section 5.2**) that may be built within the greater Kodiak area. These projects would not be expected to add to potential impacts in the Project Area, but would add to the continued degradation of shoreline habitat in the Landscape Area.

For example, the Alaska Marine Highway System (AMHS) dock and Shoreside Improvements project would involve construction of a new ferry terminal. A site has not yet been determined for that project; however, it is likely to be located near the City of Kodiak. As such, this project would be geographically removed from the Airport to the point where there would be little direct interaction with the impacts of project alternatives, and it would not be affected by construction or the physical changes associated with the RSA alternatives.

Additionally, Northland Services, Inc., proposes to develop a 3.5 acre cargo facility on private land (Shannon Point) just south of the Airport project area adjacent to USCG property. The project would permanently fill approximately 3.1 acres of submerged land in Womens Bay and install numerous pilings and dolphins in marine waters with a transfer bridge extending to a large gravel pad onshore. This project would affect aquatic species and habitats in Womens Bay by altering and filling marine habitats. This would be the closest reasonably foreseeable in-water work to the Project Area.

All of the proposed Build Alternatives would occur in areas that have already been altered by placement of armor rock during previous runway construction activities (including activities in **Table 5.1**). However, each Build Alternative would also directly remove natural shoreline habitats, replacing them with armored shoreline.

In addition, all Build Alternatives would extend armor rock from its existing location in the intertidal zone into the subtidal zone, removing existing natural subtidal habitats. Direct and indirect impacts to fisheries and invertebrates from the placement of armor rock fill are discussed in **Section 4.5, Fish and Invertebrates**.

In the Project Area, the increase in armored shoreline is likely to have a significant adverse cumulative impact on habitat for fisheries and invertebrates under all Build Alternatives. Generally, the larger the fill footprint paired with impact toward the Buskin River would result in larger cumulative impacts. The shoreline habitat in the Project Area, especially habitat at Runway End 18 and Runway End 25, is a habitat type that is unique in the Project Area. Impacts under this project, when combined with past, present or reasonably foreseeable projects, would cumulatively degrade the shoreline habitat in the Project Area for fish and invertebrates and further reduce species population and diversity. On a landscape scale, unaltered shoreline habitat is becoming increasingly limited in the greater Kodiak area and the added reduction in unaltered shoreline habitat from the alternatives would have an adverse cumulative effect on fish and invertebrates.

WATERBIRDS. Past projects in the Project and Landscape Areas have likely contributed to changes in waterbird species prey habitat, which may have altered the foraging habits of seabirds in the area. Current and future actions that may cumulatively impact waterbirds in the Project and Landscape Areas include the construction of a new ferry terminal, the St. Herman's harbor dry-dock, the rehabilitation of the current Pier 1 docking facility, and the repair/replacement of the USCG fuel pier. Those projects have the potential to cumulatively impact waterbirds only to the extent those facilities diminish marine habitat. Because of the relative distance between cumulative projects and the airport (between approximately two and greater than 10 miles) and because of the small size of the total marine footprint for these projects, it is unlikely that they would cumulatively result in significant impacts to seabird species when considered with the proposed RSA project.

The alternatives for the RSA improvement project detailed in **Chapter 2, *Alternatives***, would contribute to the net loss of between 18.7 to 31.1 acres of Steller's Eider habitat, 19.3 to 32.0 acres of Emperor Goose habitat, 16.0 acres to 26.8 acres Black Oystercatcher habitat, 15.5 to 26.2 acres of Pelagic Cormorant habitat, and 18.9 to 31.5 acres of Marbled Murrelet habitat in the Project Area, depending on the combination of alternatives selected. When considered in combination with past, present and reasonably foreseeable actions that have taken place or will take place in and adjacent to the Project Area, the impacts of this project on sensitive waterbird species in and adjacent to the Airport would not be significant because of the abundance of suitable habitat in the area and the small amount of habitat affected.

MARINE MAMMALS. As discussed in **Section 4.5.8.1, *Fish and Invertebrates***, past projects in the Project Area and Landscape Area have likely contributed to changes in marine mammal prey habitat, which may have altered the foraging habits of marine mammals in the area. Current and future actions that may impact marine mammals in the Project Area and Landscape Area include the construction of the Trident seaplane base, a new ferry terminal, the St. Herman's harbor dry-dock, the rehabilitation of the current Pier 1 docking facility, and the repair/replacement of the USCG fuel pier. Contributors to both direct and indirect impacts include environmental variability, competition with fisheries, and disturbance from vessel traffic and tourism, shoreline development, increasing likelihood of fuel and oil spills. The cumulative impacts of these factors may decrease the population size of federally listed species in the future.

The projects being considered for cumulative impact purposes would not be likely to result in an adverse effect to threatened and endangered marine mammal species and would themselves not result in significant impacts to marine mammals. Although northern sea otters were observed near the location of the Trident seaplane base and the St. Herman's harbor dry-dock (adjacent to Near Island), the small size of the marine footprint for these projects makes it unlikely that the otter or its critical habitat would be significantly impacted cumulatively by the implementation of the proposed RSA project. The location of the new ferry terminal is yet to be determined; however, it is not expected to be adjacent to the Airport.

The alternatives described in **Chapter 2, Alternatives**, would contribute to the net loss of 18.7 to 31.3 acres of marine mammal habitat (including 17.4 to 29.2 acres of Northern sea otter critical habitat and 15.1 to 27.8 acres of Steller sea lion critical habitat) in the Project Area, depending on the combination of alternatives chosen. The preferred alternatives would result in a combined impact of approximately 6.2% of Northern Sea Otter critical habitat and 5.4% of Steller Sea Lion critical habitat within the project area. When considered in combination with past, present and reasonably foreseeable actions that have taken place or will take place in and adjacent to the Project Area, the impacts of this project on marine mammal species in and adjacent to the Airport would not be cumulatively significant due to the small amount of additional habitat affected and the availability of quality habitat within the Landscape Area.

TERRESTRIAL WILDLIFE AND VEGETATION. The following sections describe the potential cumulative impacts to terrestrial vegetation and wildlife.

Vegetation. Within the Project Area and Landscape Area, there have been considerable changes in plant community distribution and composition over time. While much of the land surrounding the Airport is undeveloped, human activity has shaped the Kodiak area for as long as 7,000 years or more. During World War II, the land was used as the Kodiak Naval Operating Base, and many of these resources are still present on and near Airport property. The development of the area for naval facilities required extensive alteration of the natural environment to level the area for the construction of the naval air station. Additional changes to plant communities in the area occurred during the 1930s when the southern portion of the Buskin River floodplain and delta was leveled and/or filled and Devils Creek was diverted and placed in a culvert under the naval airfield.

More recent past projects at the Airport include the 2002 removal of a brush covered ridge and trees adjacent to Runway end 11. This development resulted in the removal of native Sitka spruce forest vegetation from the property. The 2007/2008 removal of trees and shrubs near the Buskin River resulted in the removal of native vegetation in the Project Area. Current and future projects on and adjacent to the Airport include the continued development in the vicinity of the Airport, construction of "Taxiway F," construction of a chemical storage building, and rerouting 0.76 miles of Chiniak Highway. These developments would continue to have an impact on native vegetation communities in the Project Area and Landscape Area.

While past, present, and reasonably foreseeable projects have resulted in changes to native upland vegetation communities, the proposed project would impact a very small area, ranging from 2.0 acres to a maximum of 7.9 acres when combining the two RSA project alternatives. When considered in combination with past, present and reasonably foreseeable actions that have taken place or will take place in and adjacent to the Project Area, the impacts of this project on native vegetation communities in and adjacent to the Airport would not be significant due to the relative abundance of the vegetated cover types in the surrounding area and the small amount of habitat affected relative to the overall available habitat types.

Wildlife. Historically, wildlife habitat has been altered on Kodiak due to human activities and further altered through the construction of aviation and military facilities, the diversion of Devils Creek, and leveling of the southern portion of the Buskin River floodplain and delta. Actions in the recent past, such as the removal of a brush-covered ridge and trees adjacent to the Runway 11 threshold in 2002, and removal of Sitka spruce from various portions of the Airport in 2007 have contributed to the small loss of forested wildlife habitat in the Project Area.

Current and future projects in and adjacent to the Project Area include the approval to construct a chemical storage building at the Kodiak Airport, construction of a new ferry terminal (site undetermined), construction of a new water treatment facility, paving 13 miles of Chiniak Road, the extension of Anton Larson Bay Road, construction of “Taxiway F” at Kodiak Airport, and rerouting 0.76 miles of Chiniak Highway. Some of these activities would occur outside of the Landscape Area and therefore would not contribute to the cumulative effects of RSA construction.

All of these projects would displace wildlife, forcing them into other, possibly less suitable habitats. There would also be an increased possibility of habitat degradation through the introduction of weeds into areas experiencing construction-related surface disturbance. Additionally, depending on the spatial layout of these projects, there could be increased fragmentation of habitat, making affected areas less suitable for certain wildlife species.

No significant impacts on upland wildlife are expected for the proposed project. No impacts to general terrestrial wildlife are expected due to the loss of nearshore waters. The loss of upland habitats would not impact the population dynamics and sustainability of upland wildlife species because of the very small areas (ranging from 2.0 acres to a maximum of 7.9 acres when combining the two RSA project alternatives) of upland habitats affected.

When considered in combination with past, present, and reasonably foreseeable actions that have taken place or will take place in and adjacent to the Project Area, the cumulative impacts of RSA expansion on wildlife species in and adjacent to the Airport would not be significant due to the relative abundance of similar habitat in the surrounding areas.

HISTORICAL, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL. Past actions in and around the Airport have resulted in impacts to historical, architectural, and archaeological sites associated with the World War II development and occupation of the area and to prehistoric archaeological sites associated with the ancestral Alaska Native community.

These actions have included road construction and improvement, construction of the Kodiak Naval Operating Base (now the USCG Base) during World War II, development and upgrade of the modern USCG and public airport facilities, relocation of the Buskin River during construction of the World War II base, and development of the Buskin River State Recreation Site.

For example, as noted in **Section 4.9.4**, construction of the original military base in 1941 is known to have resulted in the exhumation of at least 20 historical burials near the east end of Runway 11/29. Similarly, the development of the modern USCG Base and public airport have resulted in modifications to or removal of several World War II era resources, primarily in the context of projects that comply with the National Historic Preservation Act and Section 106 process.

The other currently proposed regional projects considered as part of cumulative impacts are, in most cases, difficult to assess in terms of potential effects on cultural resources. Many of these actions are private undertakings for which no federal laws, reporting requirements, or specific protections for cultural resources are required. Those projects with state or federal involvement would be required to comply with the appropriate statutes involving avoidance, minimization, and/or mitigation of adverse impacts to cultural resources.

Among the current projects considered for cumulative effects is the proposed Trident Seaplane Base, about 5 miles northeast of the Airport. This project would result in construction of a seaplane ramp, access road to the ramp, aircraft parking area and lease lots, installation of new floats and repairs to others, and other infrastructure improvements. The project is under the jurisdiction of the City of Kodiak and the FAA, and impacts to archaeological, historical, or cultural resources are being considered and minimized or mitigated in compliance with the National Historic Preservation Act. As such, no adverse effects to cultural resources are expected from this project, and there would be no contribution from this project to overall effects on or losses of the cultural record of the area.

Other current projects, such as the resurfacing of runways at the Airport, would directly alter historic resources. Specifically, the runways themselves are historic features of the Airport and contributing resources of the National Historic Landmark encompassing the USCG base. The resurfacing does not appreciably affect the overall design of the runways, their primary dimensions, or their configuration relative to each other and other airport features. As such, the project would not adversely affect these historical resources and would not contribute meaningfully to cumulative loss of integrity for historical, architectural, archaeological, and cultural resources in the area.

Reasonably foreseeable future actions on and around the Airport include actions that have the potential to adversely affect historical, architectural, archaeological, and cultural resources. In particular, construction of a new ferry terminal, various roadway improvement and construction projects, and construction of a new taxiway and apron at the Airport could affect such resources. However, the vast majority of these projects would be undertaken under federal jurisdiction and would require compliance with federal laws to avoid, minimize, or mitigate impacts to archaeological, historical, architectural, and cultural resources. Therefore, the net impact of these projects on such resources is not expected to be significant.

It should be noted, though, that multiple new construction projects are planned for the USCG base. These include repair and improvement of the fuel pier, renovation of Hangar 2, and renovation of the existing enlisted personnel dining facility.

Combined with the proposed construction of a new taxiway and apron at the Airport and the proposed extension of landmass to accommodate the runway safety area improvements, these projects would result in noticeable changes to the configuration of the National Historic Landmark. However, these changes are not expected to rise to the level of significance, as the nature, use of space, interaction between features, setting, feeling, and association of the Landmark would remain largely intact.

When considered in combination with past, present, and reasonably foreseeable actions, implementation of any of the RSA build alternatives or any combination of alternatives for the two runways would not contribute to increased loss of any known historical, architectural, archaeological, or cultural resources for the reasons stated above.

However, there would be significant change in access to and abundance of those customary and traditional resources that are the subject of traditional cultural practices, such as sharing and providing for the elderly or infirm, and are linked to the tribal identity of the Sun'aq Tribe of Kodiak (Sun'aq), the Native Village of Afognak (NVA), and Tangirnaq Native Village (TNV; formerly Woody Island Tribal Council). Because past actions have altered subsistence resources in the area, implementation of any combination of Build Alternatives is expected to produce significant cumulative adverse effects on customary and traditional cultural practices and related cultural identity (see **Section 4.9**).

SOCIOECONOMIC IMPACTS, ENVIRONMENTAL JUSTICE, AND CHILDREN'S ENVIRONMENTAL HEALTH AND SAFETY. Several recent occurrences, such as the reduction of crab and ground fish allowed to be caught by the Kodiak commercial fishing fleet because of species management actions, slowing tourism activity, and the worldwide recession have negatively impacted the economy of the area. In addition to business income, tax revenue, and jobs created in the community, the aviation safety improvements at the Airport would encourage visitation and associated spending in the Kodiak Island Borough area economy. When considered in combination with past, present, and foreseeable actions that have occurred on a regional and local level, the positive economic impacts from these projects would likely bring additional income to the community.

Due to the significant impact on fisheries of the Buskin River (particularly for subsistence species such as sockeye, coho and pink salmon), there would be a socioeconomic impact on Kodiak residents who use subsistence resources (over 99 percent of the population). Because almost all residents in Kodiak tend to use subsistence resources, the impact would affect nearly the entire population.

However, because subsistence resources affect take home resources for food, the reduction in subsistence resources per capita would likely be felt to a larger extent by low income populations because higher income populations could generally make up the difference in subsistence use through other resources (salary, etc.).

As stated in the Fish and Invertebrates and Subsistence Cumulative Analyses contained within this chapter, other past projects in the area have led to a degrading of marine habitat that can be linked to subsistence resources. Additionally, other marine projects have been identified (**Section 5.2**) that may be built within the greater Kodiak area. These projects would not be expected to add to potential impacts in the Project Area itself, but would add to the continued degradation of shoreline habitat in the Landscape Area and thereby could combine to have additional, cumulative impacts on low-income populations if the other impacts additionally reduce the availability of subsistence resources to the low-income subsistence users. Therefore, there could be a cumulative effect on low-income populations as a result of other past and present projects that may have affected subsistence resources in the area.

Additionally, because subsistence practices are tied to customary and traditional practices and the cultural identity of the Sun'aq Tribe of Kodiak, Tangirnaq Native Village, and the Native Village of Afognak, there could be a disproportionately high and adverse effect on those minority populations relative to cultural practices and identity that could result in cumulative effects as a result of other past projects that affected subsistence resources. As stated in the Subsistence Cumulative Analyses While projects such as development of wind turbines on Pillar Mountain, extension of the Anton Larsen Bay road, and improvements in Trident Basin could affect subsistence resources, none of the anticipated impacts from those projects are expected to reach a level of significance by themselves. However, the combination of most RSA Build Alternatives in this EIS with these projects may create significant impacts to subsistence resources and uses that could have a corresponding cumulative effect on customary and traditional practices and the cultural identity of the Sun'aq Tribe of Kodiak, Tangirnaq Native Village, and the Native Village of Afognak. These potential indirect effects on low-income and minority populations would not occur with Runway 18/36 Alternative 7, because it avoids fill into the Buskin River area, therefore avoiding the potentially significant subsistence impacts.

No significant adverse impacts such as an increase in noise over residential areas are expected to occur to populations of children and, no adverse impacts to the health and safety of children are expected.

See the **Fish and Invertebrates** and the **Subsistence** sections of this Chapter for additional information on cumulative effects regarding subsistence resources.

SUBSISTENCE. Various projects beyond those being assessed in this EIS have been completed or are planned for the Kodiak area that may impact subsistence resources and uses. Previous projects within the Chiniak Bay could have affected subsistence resources in the past, through reduction in unaltered shoreline habitat (See **Section 4.5, Fish and Invertebrates**). Future projects, such as the potential replacement/rehabilitation of the fuel dock on the US Coast Guard base and Northland, Inc.'s proposed cargo facility would affect waters in Chiniak Bay, which would also affect fish habitat within the landscape area.

However, these projects are not expected to affect important habitat, such as freshwater-influenced nearshore habitat. Therefore they would not result in cumulative impacts to the freshwater-influenced habitat important for salmonids.

Some projects, such as construction of a UV water treatment plant, may actually improve conditions for subsistence resources and uses by reducing the amount of waste-based pathogens entering Chiniak Bay. While a few of the projects identified may affect subsistence resources in other locations, such as development of wind turbines on Pillar Mountain, extension of the Anton Larsen Bay road, and improvements in Trident Basin, none of the anticipated impacts from those projects are expected to reach a level of significance by themselves. However, when combined with any of the RSA action alternatives in this EIS (except RSA 18/36 Alternative 7), it is anticipated there would be significant impacts to subsistence resources and uses, predominantly from the RSA action alternatives (Runway 07/25 Alternatives 2 and 3 and Runway 18/36 Alternatives 2–6) analyzed in this EIS.

NOISE. When considered in combination with past, present, and foreseeable actions that have occurred on a national and local level, aircraft noise exposure has declined since the advent and introduction of commercial jet service in the early 1960s. As summarized in **Section 4.12**, the proposed project would not increase the population affected by significant aircraft noise levels, as no people or housing units are located in the 65 DNL and greater noise contour.

Other projects in the area could increase noise due to surface traffic and vessel traffic. However, due to the location from the Airport and the fact that there would be no substantial long-term adverse noise impacts from the proposed airport project, there would not be an adverse cumulative impact.

COMPATIBLE LAND USE. While the proposed project alternatives would modify the land uses within the immediate development area, the land uses changes would be acceptable within the current land use and zoning regulations governing the areas. No other projects are anticipated within the Project Area that would modify or impact land uses. Within the region, the proposed RSA improvement project would not result in any significant land use impacts when combined cumulatively with other regional development projects.

No cumulative aircraft noise impacts would result from the project alternatives, and therefore, no cumulative land use incompatibilities would occur when combined with other regional projects.

DEPARTMENT OF TRANSPORTATION (DOT) SECTION 4(f). When combined with past, present, and reasonably foreseeable projects, there would not be significant cumulative impacts to Section 4(f) properties caused by the proposed RSA improvements. While the proposed project would result in a physical use of the Alaska Maritime National Wildlife Refuge, impacts to the Refuge would be localized and limited to the airport environment and surrounding project area.

When the Refuge was created under the Alaska National Interest Lands Conservation Act (ANILCA), provisions were included to allow for those lands to be used for transportation or utility systems, which include airports, as approved by reviewing agencies. This provision was included with the recognition that certain areas of the Refuge would need to be utilized to maintain and improve the limited transportation resources in Alaska. The Refuge in total covers 4.9 million acres, with 8,300 acres of Refuge lands adjacent to the airport. The proposed project would result in a maximum physical use of 30.6 acres of Section 4(f) resources, with the preferred alternatives having a combined physical use of 18.0 acres of Refuge lands.

Potential cumulative impacts to the Alaska Maritime National Wildlife Refuge could result from continued incremental development within the refuge both in the Project Area as well as throughout the Refuge as a whole. Ongoing Airport USCG operations and improvements within Womens Bay and Chiniak Bay do have incremental impacts on the Refuge, that, when combined with the proposed project, would result in a greater total impact to the resource. Nonetheless, continued management of the refuge lands by the USCG and USFWS within the vicinity of the project would be necessary to maintain the purposes of the refuge despite ongoing development pressure.

No other projects planned for the airport vicinity are expected to produce impacts on Finny Beach, Buskin Beach, or the Buskin River State Recreation area. Further, when considered in combination with past, present, and reasonably foreseeable actions that have occurred on a national and local level, implementation of the proposed project would not contribute to increased loss of any known historical, architectural, archaeological, or cultural resources protected under Section 4(f). Therefore, the proposed project would not produce any cumulative impact on the access to, or use of, 4(f) resources.

LIGHT EMISSIONS AND VISUAL IMPACTS. The lighting changes as a result of the alternatives would be minimal and would match existing conditions at the Airport. Past and present projects have not substantially altered the airfield lighting. While future projects may include additional lighting (such as the addition of lights for a new taxiway), this additional lighting would not be substantially apparent to the casual viewer.

When the potential impacts of unrelated past, present, and reasonably foreseeable future projects are analyzed cumulatively with the proposed Airport project, there are no predicted cumulative impacts related to light emissions because there would be no significant impacts as a result of the proposed project and no past, present or reasonably foreseeable projects that would significantly change the lighting at or in the vicinity of the Airport. Additionally, no other construction projects that would be visible from viewpoints outside the Airport are proposed for the construction timeframes for the RSA improvement project that could result in cumulative construction lighting impacts.

When the potential impacts of unrelated past, present, and reasonably foreseeable future projects are analyzed cumulatively with the proposed Airport project, there is the potential for increased, adverse effects to visual resources within the project viewscape. Future projects include the construction of an apron area and taxiway within the Airport, and constructing a wind turbine system on Pillar Mountain.

The proposed future construction of the Airport apron and taxiway (scheduled for 2015) would create additional visually intrusive short-term impacts from construction vehicles, construction equipment, and surface disturbances at the same time that the proposed RSA extensions would be scheduled for construction. The impacts from these activities would be in the short-term, as once the construction activities had been completed, and vehicles and equipment were removed, it is likely that the changes to the Airport would not attract casual viewer attention.

The proposed wind turbine development of 3 turbines on Pillar Mountain (started in 2009) would potentially have additional visually intrusive, adverse impacts to visual quality, when combined with the potential impacts from RSA construction.

It should be noted that the wind turbine development includes the potential for an additional 3 turbines to be constructed once the first three are operational. The greatest affect would be on observers in the vicinity of the Project Area with views of Pillar Mountain (e.g., Finny Beach). Depending on the site selected for construction, viewers at these locales would potentially have clear foreground views of the RSA extensions and background views of the proposed wind turbine system. The cumulative impact of these developments would potentially have greater long-term adverse impacts on the viewscape because foreground and background views would be affected and because both these landscape developments would be visible to the casual viewer.

All other unrelated past, present, and reasonably foreseeable future projects would result in short-term visual impacts from construction activities. No other long-term visual impacts would occur from these other projects.

HAZARDOUS MATERIALS, POLLUTION PREVENTION, AND SOLID WASTE.

Reasonably foreseeable future projects likely would include the use of heavy machinery with associated fuels and lubricants. The combination of the incremental use of fuels and lubricants of all projects, if used properly, would still meet state and federal regulations on hazardous materials and solid waste and therefore does not exceed the significance thresholds established for this project (**Section 4.16.3.2**). All construction projects are anticipated to generate inert solid waste and construction debris. Their cumulative waste stream is not anticipated to overwhelm the Kodiak landfill, as there is sufficient capacity through 2014 (CH2MHill 2011). Additionally, a new lateral expansion is scheduled to be constructed in 2012 and would provide landfill capacity for the Kodiak Island Borough until approximately 2022-2024 (KIB 2012). Because of the former military and ongoing aviation activities that have occurred in the Project Area, there is increased potential to encounter undocumented areas of contamination as the number of total projects involving excavation at the Airport increases. However, such reasonably foreseeable projects are limited and BMPs as described in **Section 4.16.6 Construction Impacts** would reduce the likelihood for further environmental damage and of worker exposure to hazardous materials. As a result, no significant cumulative impacts associated with hazardous materials and/or solid wastes are anticipated.

FARMLAND. There is no prime farmland in the State of Alaska; therefore, no cumulative impacts on this resource could occur from the proposed actions combined with past, present, and foreseeable actions.

NATURAL RESOURCES AND ENERGY SUPPLY. Past, present, and reasonably foreseeable projects that would require the use of additional fill material include: the rehabilitation of Rezanof Drive, upgrade and repair of Mission Road, and the extension of Larson Bay Road, among others. These projects, paired with the combination of the most fill-intensive RSA Build Alternatives, could combine to place a large demand on existing source material on Kodiak Island. However, the largest amount of fill required for the RSA project for both runways and the other reasonably foreseeable projects could be met by the quarries on Kodiak and other available non-local areas.

There would not be a potential combined effect on electricity, wood, water, or other resources from the Build Alternatives combined with any of the reasonably foreseeable alternatives. None of these resources are in short supply in the Kodiak area and the combined projects would not threaten the viability of these resources.

AIR QUALITY. The proposed project would not increase the number or type of aircraft operations at the Airport, and would also not increase surface traffic. None of the other present or reasonably foreseeable projects would result in increases of surface traffic or operations that could cumulatively affect air quality.

Therefore, there would not be any significant cumulative impacts to air quality and the ability of the area to meet National Ambient Air Quality Standards (NAAQS) would not be affected.

CLIMATE. The cumulative impact of the Build Alternatives on the global climate when added to other past, present, and reasonably foreseeable future actions is not currently scientifically predictable. Aviation has been calculated to contribute approximately 3 percent of global carbon dioxide emissions; this contribution may grow to 5 percent by 2050. The proposed RSA improvements would increase GHG emissions slightly during construction, but would not have any long-term impacts on GHG emissions. At present there are no calculations of the extent to which measures individually or cumulatively may affect aviation's CO₂ emissions. Moreover, there are large uncertainties regarding aviation's impact on climate. The FAA, with support from the U.S. Global Change Research Program and its participating federal agencies has developed the Aviation Climate Change Research Initiative (ACCRI) in an effort to advance scientific understanding of regional and global climate impacts of aircraft emissions, with quantified uncertainties for current and projected aviation scenarios under changing atmospheric conditions.

WILD AND SCENIC RIVERS. There are no wild and scenic rivers within the Project Area or on Kodiak Island; therefore, no cumulative impacts on this resource could occur from the Build Alternatives combined with past, present, and foreseeable actions.

CONSTRUCTION IMPACTS. The primary cumulative construction impacts that could result from other projects are truck traffic impacts. When considered in combination with past, present, and reasonably foreseeable actions in the vicinity of Kodiak Airport, the construction impacts from implementation of any RSA Build Alternative or a combination of those alternatives would not result in any significant construction related impacts at the Airport. As noted in Table 5-2, a number of other construction projects would occur at the airport and in the region during the same time as the proposed project. However, the proposed project and the other construction projects beyond the airport would not result in cumulative significant construction impacts because there would be minimal overlap of impact areas.

Current projects at the airport, including the repair of the runways, construction of the chemical storage building and upgrade of Mission Road may create additional surface traffic associated with constructing these projects in the vicinity of the Airport. However, this construction-related truck traffic would likely be complete by the time the project alternatives evaluated in this EIS begin construction. Therefore, implementation of the alternatives in this EIS would not be expected to result in cumulative adverse construction-related impacts.

The future projects near the Airport include the renovation of various Coast Guard facilities (2014 – 2016), among others. These additional projects could cause construction-related impacts associated with truck traffic in the vicinity of the Airport. There could be a potential combined effect from the proposed alternatives described here combined with the additional developments described above. All of these projects could require construction trucks to be moving material and equipment in the same general vicinity at the same time. However, since each project would need to monitor the haul routes for damage, there are not anticipated cumulative impacts to the road system from the additional construction traffic.

References

- CH2MHill. *Kodiak Landfill: Remaining Life and Feasibility of Additional Vertical Expansion over Top Deck*. (CH2MHill, Technical Memorandum for Kodiak Island Borough. October 2011).
- KIB. 2012. Kodiak Island Borough Landfill website accessed January 30, 2012 at <http://www.kodiakak.us>.